INTEX-NA Flight 14: 31 July 2004

Flight # 14 was the sixth DC-8 science flight from Pease. The main objectives were to under-fly Terra (MOPITT/MODIS), Envisat (SCIA), and Aqua (AIRS) satellites, sample low level North American outflow and aged air pollution south of the Bermuda high, and conduct a comparison between the measurements on the DC-8 and the NOAA P-3. Takeoff was at 1445 UT with a total flight duration of 9.3 hours. The flight plan and flight profile is shown in the attached slides. The northern tip of the flight leg was adjusted some to achieve the planned 2250 UT rendezvous with P-3.

Meteorological conditions were dominated by high pressure. Specifically, the flight headed southeast toward the subtropical (Bermuda) high that at the surface was centered near 35^{o} N, 42^{o} W. This warm core system maintained its identity through 500 mb, but became somewhat diffuse at higher levels. The flight track carried us southwest of the surface center. Seven day back trajectories throughout the troposphere showed re-circulating paths about the center, with some inflow from the northwest and also from the Caribbean. The second major surface feature was a weak cold front that was advancing toward the Pease area from the west. It was associated with a short wave trough aloft. There was little cloud cover during the flight, mainly because the track extended into the subtropical high where subsiding air dominates.

DC-8 traveled in the southeasterly direction with a take off time specifically designed to achieve a timely underpass of three satellites. We descended from 2900 to 1000 ft well within the swaths of SCIA, MOPITT, and AIRS under virtually cloud free conditions at all altitudes at 1600 UT . This single spiral was timed to satisfy validation needs of instruments on these three satellite. A number of pollution layers were encountered during descent where O3 approached or exceeded 90 ppb. The boundary layer was relatively clean (O3: 20 ppb; CO: 80 ppb; SO4: 0.5 mg/m3) although SO2 mixing rations approached 4 ppb. There was no indication of biomass combustion influences (little change in HCN). High upper level O3 concentrations persisted throughout the southern leg of this trip. There was indication from lidar observations that even higher concentrations may be present between 30000 and 40000 ft. Short climb to 37000 ft indicated stratospheric influences with O3 exceeding 120 ppb. There was little evidence of the Saharan dust. At the southeasterly point the boundary layer was extremely clean and O3 declined to as low as 15 ppb. The high O3 levels of 70-100 ppb between the 20-31000 ft altitudes continued to persist through the remainder of this flight. We rendezvoused with the P-3 at the expected time to conduct a wing- tip to wing- tip comparison at 10000 ft and 1000 ft altitudes. This comparison occurred under relatively clean conditions. Subsequently the DC-8 attempted to sample the predicted low level pollution outflow from North American. This outflow was found to be very weak with pollutant concentrations significantly lower than predicted (CO: 90 ppb; O3: 50 ppb).

The navigational data are available at URL: http://www.dfrc.nasa.gov/Research/AirSci/DC-8/ICATS/index.html

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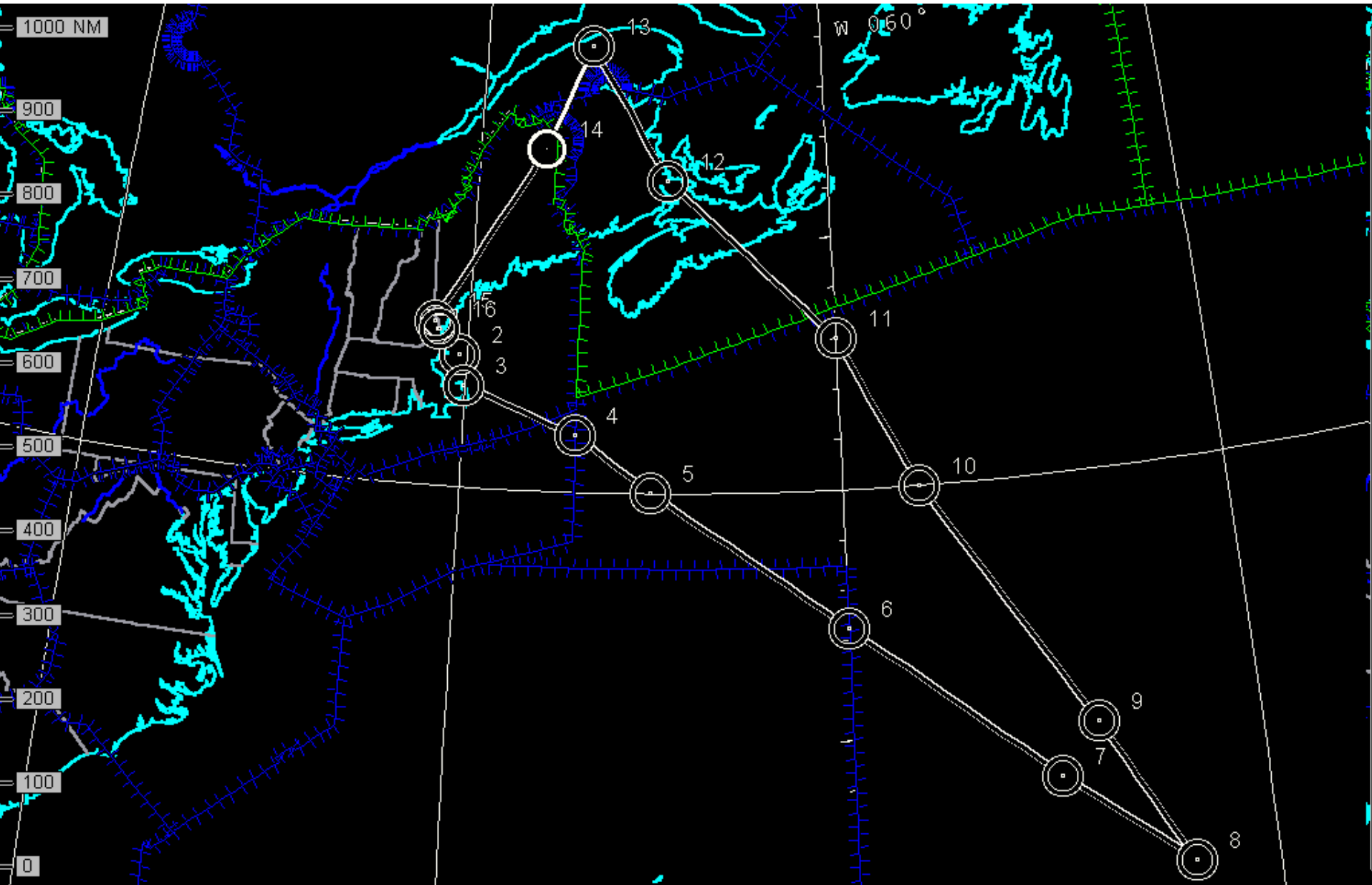

TYPE ACFT	CALL SIGN	DATE	FROM	TO	PLND TO	ACT TO	PILOT	COPILOT
DC-8	NASA817		PEASE INTL TR N 43 05.5 W070 50.0	PEASE INTL TR N 43 04.7 W070 49.4	14:47.8			

TOT DIST	TOT TIME	FUEL REQ	NAVIGATOR	ENGINEER
2741.6	09+25.9	87480		

TP DTD#	Fix/Point Description	FREQ	Latitude Longitude	Alt Wind	TAS GS	TC MC	LEG DIST DIST REM	LEG TIME TIME REM	ETA	RETA	ATA	REMARKS
1	KPSM 16/RW PEASE INTL TR		N 43 05.5 W070 50.0	94M		149 165	5.0 2737	00+03.0 09+23	14:47			
2	SCUPP/W SCUPP		N 42 36.2 W070 13.8	18944M	N/A N/A	136 152	34.7 2702	00+06.3 09+17	14:57			
3	LFV/E MARCONI	094X 114.70	N 42 01.0 W070 02.2	21000M	350 350	166 182	36.2 2666	00+06.1 09+10	15:03			
4	DOVEY/W KNZY		N 41 07.0 W067 00.0	33000M	400 400	112 129	147.1 2519	00+21.4 08+49	15:24			
5	.40N65W SPIRAL		N 40 00.0 W065 00.0	33000M	400 400	126 143	113.3 2405	00+17.0 08+32	15:41			
	.delay		N 40 00.0 W065 00.0	33000M	330 330	126 144	0.0 2405	00+35.0 07+57	16:16			
6	.37N60W none		N 37 15.0 W060 00.1	20000M	N/A N/A	126 144	287.0 2118	00+49.1 07+08	17:05			
7	.34N55W none		N 34 00.0 W055 00.0	20000M	330 330	129 146	312.6 1806	00+56.8 06+11	18:02			
8	.32N52W none		N 32 00.0 W052 00.0	20000M	330 330	128 146	193.0 1613	00+35.1 05+36	18:37			
9	.35N54W none		N 35 00.0 W054 00.0	20000M	330 330	331 348	205.8 1407	00+37.4 04+59	19:15			
10	.40N58W none		N 40 00.0 W058 00.0	20000M	330 330	328 346	355.2 1052	01+04.6 03+54	20:19			
11	CARAC/W CZQM		N 43 00.0 W060 00.0	20000M	330 330	333 352	201.2 850	00+36.6 03+17	20:56			
12	YQM/R MONCTON	120X 117.30	N 46 11.3 W064 34.2	20000M	330 330	314 334	273.8 577	00+49.8 02+28	21:46			
13	CASTR/W CASTR		N 48 52.0 W066 50.0	20000M	330 330	330 350	185.2 392	00+33.7 01+54	22:19			

DTD#	Description		Longitude	Wind	GS	MC	DIST REM	TIME REM				
14	PQI/E PRESQUE ISLE	111X 116.40	N 46 46.5 W068 05.7	10000M	N/A N/A	202 221	135.6 256	00+30.3 01+24	22:50			
	.delay	111X 116.40	N 46 46.5 W068 05.7	10000M	330 330	202 221	0.0 256	00+15.0 01+09	23:05			
15	EPDEY/W EPDEY		N 43 14.5 W070 57.5	10000M	250 250	210 227	244.5 11	00+58.7 +10	00:03			
16	KPSM/A PEASE INTL TR		N 43 04.7 W070 49.4	100M		149 165	11.5 0	00+10.0 +00	00:13			

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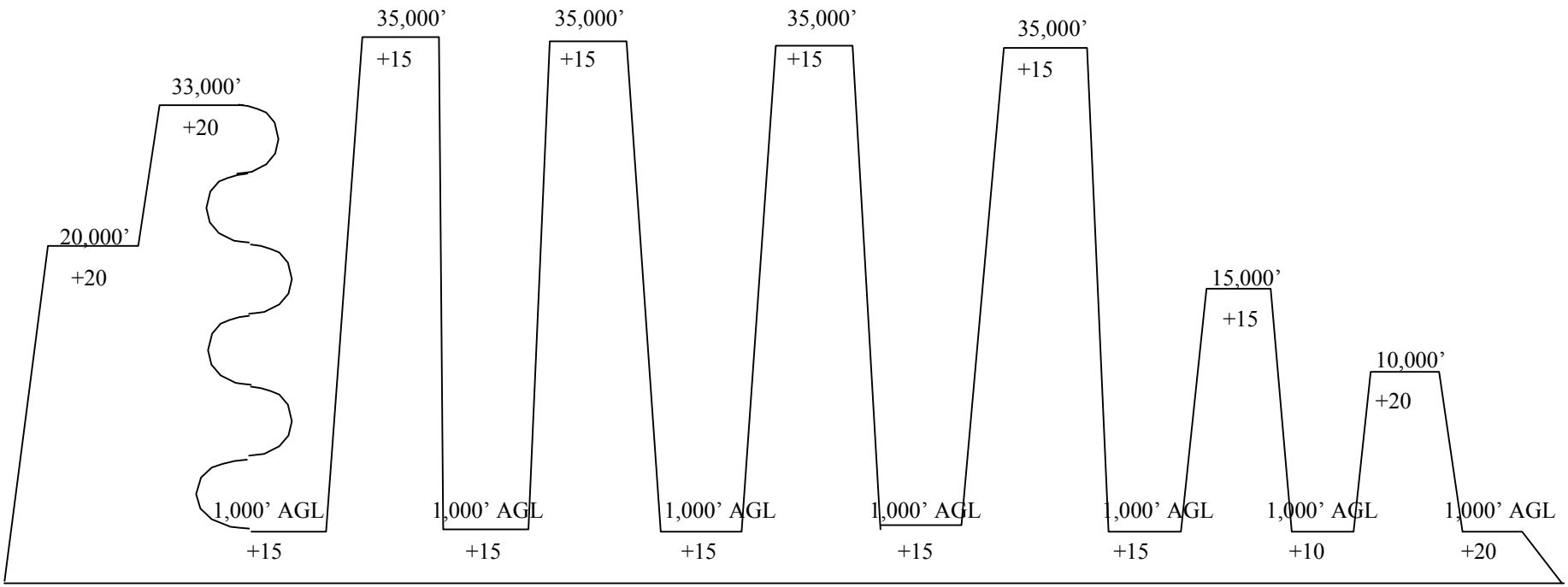
SPIRAL CLIMBS

to 10,000 msl @1,000 fpm

then 1500 fpm

ALL ENROUTE CLIMBS/DESCENTS

1500 FPM



PSM PT5 PT7 CASTR PQI PSM

- Satellite underpass (Tr/Aq/Env)
- Aged air sampling/ recirculation
- Low level outflow
- P-3 inter-comp
- Possible Asian influences